

Technical Refinements in Autologous Hand Rejuvenation

Nathaniel L. Villanueva, M.D.
 Sean M. Hill, M.D.
 Kevin H. Small, M.D.
 Rod J. Rohrich, M.D.

Dallas, Texas



Summary: The aging hand is characterized by skin changes and soft-tissue deflation, which leads to rhytides, dermal atrophy, and distinct anatomical structures. Soft-tissue deflation and prominent hand anatomy can be corrected with volume augmentation using dermal fillers or lipofilling. Fat transfer volumizes the hand with prolonged durability and efficacy, autologous tissue replacement, and possible dermal regeneration. The senior author's (R.J.R.) technique for hand rejuvenation is described, which uses minimal access and blunt dissection to effectively augment the soft-tissue compartments of the hand. This approach addresses the prominent aged anatomy of the hand, providing excellent contour and aesthetic outcomes. (*Plast. Reconstr. Surg.* 136: 1175, 2015.)

The demand for hand rejuvenation is increasing secondary to the high visibility of this area.^{1,2} Furthermore, patients seeking facial rejuvenation request hand interventions because of an increasing awareness of the dichotomy between the youthful face and the aged hands.³ Interestingly, one can estimate a person's age by viewing the hands alone, adding to the desire for these procedures.^{4,5}

Aging hands are defined by environmentally induced skin changes and subcutaneous volume loss, which leads to rhytides; thinning of the dermis; distinct veins; and prominent tendons, metacarpal bones, and metacarpophalangeal joints.^{2-4,6} Various procedures to improve the appearance of the aging skin have been described, from topical treatments to laser therapy.^{3,5-7} In addition, soft-tissue deflation and prominent hand anatomy can be corrected with volume augmentation using dermal fillers or lipofilling.^{1,3,5,7-14} Dermal fillers require no anesthesia or donor-site morbidity. However, they dissipate after 1 year, necessitate repetitive treatments, and may be cost prohibitive; in addition, they may cause an underlying bluish discoloration and subcutaneous nodules.^{7,12,14,15} Conversely, fat transfer volumizes the hand, with prolonged durability, autologous tissue, and possible dermal regeneration.¹⁶⁻¹⁸

In the 1980s, Fournier first described autologous fat grafting for hand rejuvenation by injecting a bolus of fat into an isolated area in the hand

and subsequently massaging the injection over the entire surface.^{1,11} However, this approach had contour irregularities and unpredictable fat survival. Later, Coleman suggested blunt, subcutaneous tunneling with multiple injections and more consistent results.^{1,2} However, his approach is time intensive and requires multiple injections for hand volumization. The technique of the senior author (R.J.R.), described below, is a hybrid approach that gives optimal contouring of the hand while being time-sensitive and less traumatic.

PATIENTS AND METHODS

Anatomy

The dorsal hand anatomy relevant to hand rejuvenation has been previously described by the senior author.² Briefly, the subcutaneous tissue in

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From the Department of Plastic Surgery, University of Texas Southwestern Medical Center.

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the dorsum of the hand is divided into three distinct fatty laminae with intervening fascia (Fig. 1). The dorsal superficial lamina contains subcutaneous fat. Deep to its fascia is the dorsal intermediate lamina, which contains the large visible veins and sensory nerves. The superficial and intermediate laminae are the recipient beds for autologous fat transfer. The deepest fatty lamina is the dorsal deep lamina, which contains the extensor tendons, and its fascial floor is the dorsal deep fascia, which envelops the dorsal interosseous muscles and metacarpal bones. Traversing the dorsal superficial lamina are eight to 12 septal adhesions, which contain perforating vessels supplying the subdermal plexus.

Patient Selection

Ideal candidates for this procedure have age-related changes to the hands as described above and realistic expectations. Furthermore, given the variability in fat graft survival, patients should be advised that additional fat grafting sessions may

be required to achieve the desired results. Contraindications include acute hand abnormality and certain systemic conditions, including coagulation disorders, lipid metabolism disorders, severe chronic disease states, and acute infections.

Markings

The metacarpal bones are identified and marked longitudinally on the dorsum of the hand. Prominent vasculature and atrophic areas are delineated. In addition, fat grafting donor sites are outlined.

Tissue Harvest

After antiseptic cleaning of the donor site, adipose tissue is harvested using a 10-ml syringe attached to a 14-gauge cannula with dry technique liposuction; our practice favors this approach because of presumably less trauma to the adipocytes.¹⁹ In addition, we prefer to aspirate autologous tissue from the inner thigh because

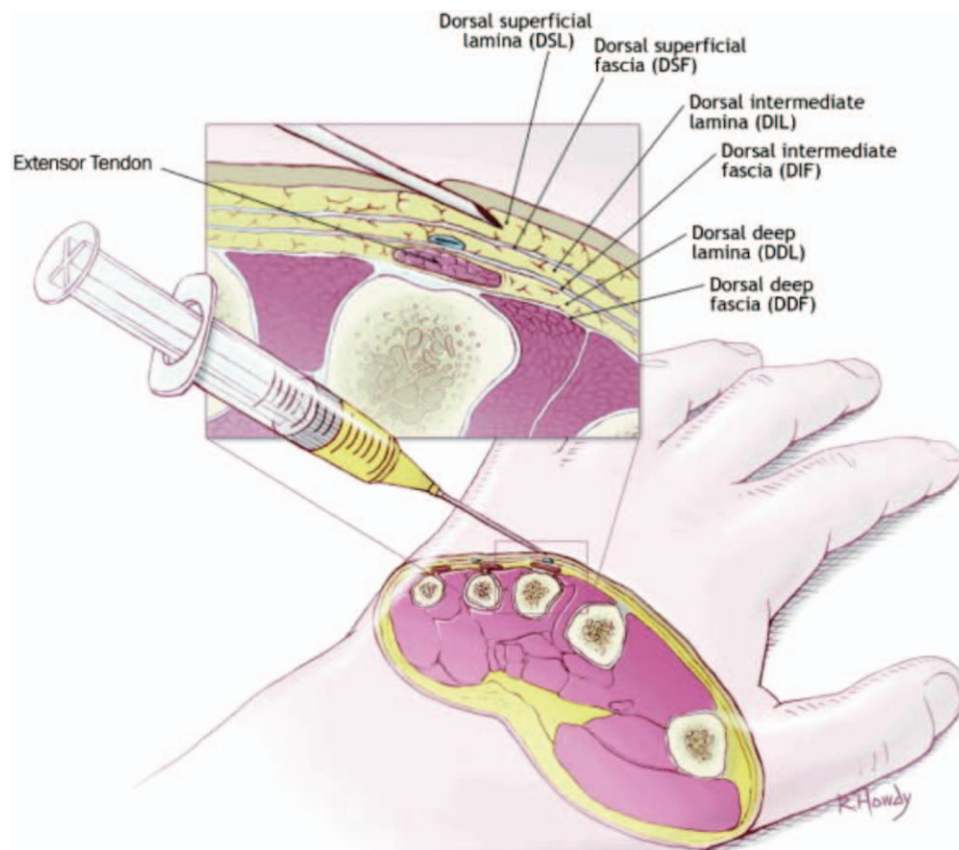


Fig. 1. Illustration demonstrating the different fascial layers and fatty laminae, with an injection cannula placed within the dorsal superficial lamina. A sharp needle is used to create a stab incision to allow access for a blunt cannula that is used for fat injection. (Reproduced with permission from Bidic SM, Hatef DA, Rohrich RJ. Dorsal hand anatomy relevant to volumetric rejuvenation. *Plast Reconstr Surg.* 2010;126:163–168.)

of superior graft take²⁰ and, anecdotally, minimal patient discomfort. Of note, approximately 20 to 25 ml of tissue is required for each hand. The harvested tissue is then centrifuged for 1 minute at 1200 rpm, decanting the oil and water layers, so the middle fat can be injected.

Fat Grafting

A stab incision is made with a 14-gauge needle into a subcutaneous plane between the third and fourth metacarpophalangeal joints of the hand. Using this access point, a 10-ml syringe, and a 14-gauge blunt cannula, a subcutaneous plane is bluntly dissected from distal to proximal on the dorsum, with care taken to not injure the dorsal veins. The harvested fat is injected in a serial fanning technique as the cannula is withdrawn. The first 10 to 15 ml of graft is deposited in the distal two-thirds of the hand and ulnar aspect to augment the region dorsal to the hypothenar eminence, and massaged proximally to obtain a smooth contour. A second stab incision is made into a subcutaneous plane between the first and second metacarpals; an additional 10 ml of harvested fat is injected into the proximal one-third of the hand and radially to augment the region dorsal to the thenar eminence. Finally, gentle massage creates an even distribution and smooth contour. (See **Video, Supplemental Digital Content 1**, which demonstrates dorsal hand rejuvenation with autologous fat injection, available in the “Related Videos” section of the full-text article on PRSJJournal.com or, for Ovid users, available at <http://links.lww.com/PRS/B494>.)

Dressing and Postoperative Care

The hands are then padded with gauze dressings and wrapped with a noncompressive Kerlix

(Covidien, Minneapolis, Minn.) and elastic bandage (Covidien). These dressings are removed 24 hours postoperatively, and the hands, ideally, are elevated for the next 48 hours. Otherwise, the patients have no restrictions on hand movements. Swelling should resolve after 10 days, and final results should be visible in 3 to 4 weeks.

CASE REPORT

Figure 2 demonstrates preoperative and 7-month postoperative images of a sample patient after autologous fat rejuvenation with optimal outcomes.

DISCUSSION

Hand aging has been characterized by both intrinsic and extrinsic factors.^{6,7} Epidermal and dermal changes to the hand have been described as extrinsic factors, whereas changes in the deeper soft-tissue planes are described as intrinsic factors. Age-related changes to the epidermis and dermis are environmentally related, and include solar lentigines, solar purpura, punctate hypopigmentation, and actinic keratosis. Intrinsic aging of the hands leads to rhytides and loss of subcutaneous fat, which reveals the underlying veins, tendons, metacarpals, and metacarpophalangeal joints.^{2-4,6} The appearance of the dorsal skin can be improved with laser therapy, topical acids, bleaching agents, dermabrasion, and chemical peels.^{3,6,7} Age-related intrinsic changes are addressed primarily with restoration of subcutaneous volume. Various modalities have been described for volume augmentation, but autologous fat remains the treatment of choice because of the durability, volumization, and possible dermal regeneration.^{3,14-18} In addition, this procedure can easily be performed, with the “lift-and-fill” rhytidectomy



Video. Supplemental Digital Content 1, which demonstrates dorsal hand rejuvenation with autologous fat injection, is available in the “Related Videos” section of the full-text article on PRSJJournal.com or, for Ovid users, at <http://links.lww.com/PRS/B494>.

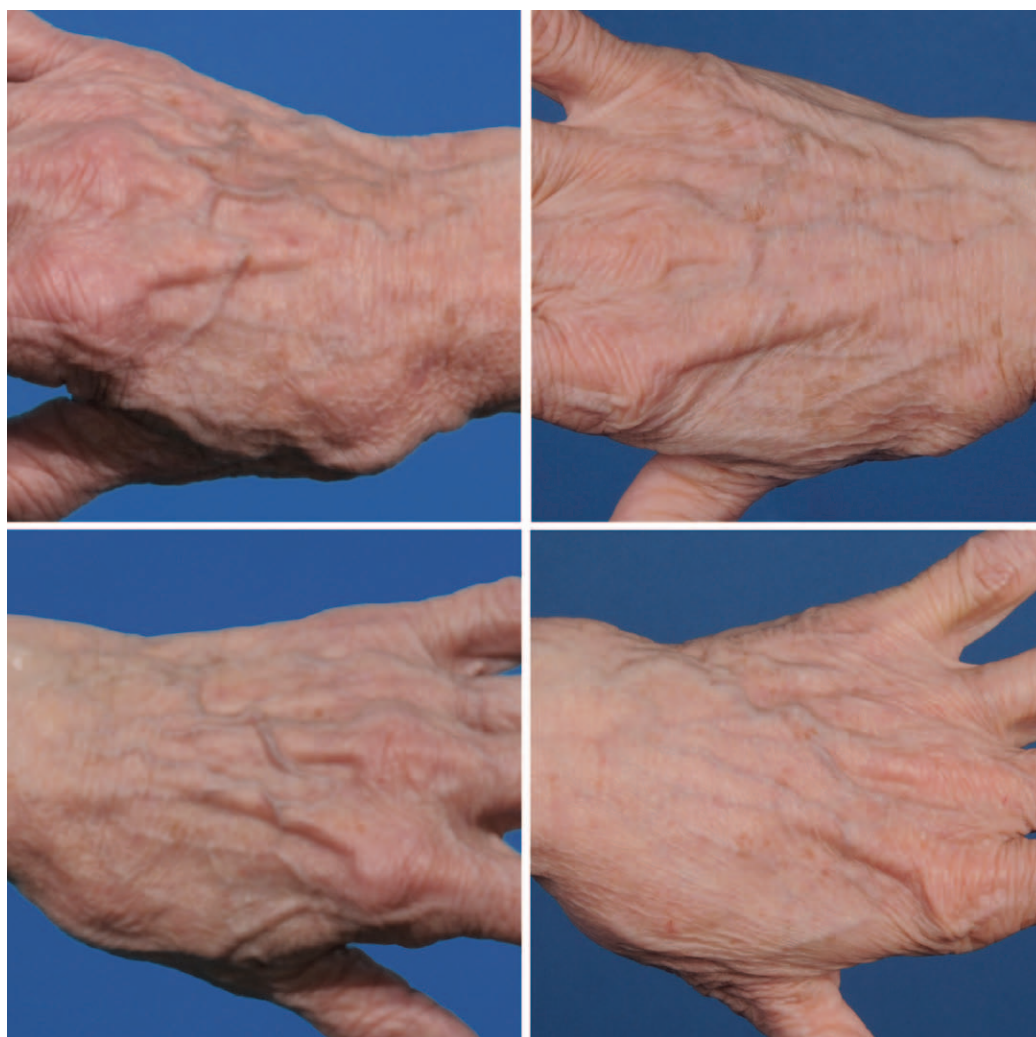


Fig. 2. A 77-year-old woman with no significant medical history who presented with complaints of aging face and hands. The patient requested concomitant facial rhytidectomy and hand rejuvenation with autologous fat grafting. The patient underwent fat harvest and grafting from the inner thighs to the hands as described, with a total of 20 ml of fat grafted per hand. No complications were encountered during this procedure. Seven months postoperatively, the patient obtained desired aesthetic results, with restoration of fullness, contour, and decreased prominence of dorsal hand structures. (Above, left) Preoperative right hand. (Above, right) Seven-month postoperative right hand. (Below, left) Preoperative left hand. (Below, right) Seven-month postoperative left hand.

to achieve global youthful rejuvenation adding approximately 15 to 20 minutes to the surgical case. In our practice review, dorsal hand rejuvenation has been performed in 5 percent of all lift-and-fill rhytidectomies, depending on patient selection, surgical assessment, and patient desires. Of note, we strongly believe the incidence of this procedure would inherently increase if offered to all patients.

Using blunt dissection and only two access points, as described in this technique, we placed fat grafts above the dorsal deep fascia throughout the dorsal superficial and dorsal intermediate

laminae, minimizing the prominence of the tendons, metacarpals, and vasculature. Furthermore, this approach decompartmentalizes the superficial and intermediate laminae, allowing even distribution of fat throughout these layers; of note, massaging supplements a smooth, equal delivery. Importantly, blunt dissection in the dorsal superficial lamina preserves perforating vessels and decreases the risk of ecchymosis and hematomas. In addition, use of only two access points minimizes trauma, with optimal outcomes.

With 20 to 25 cc of autologous fat transferred to each hand, the majority of the prominent

structures will have an improved, natural appearance after 6 months. On occasion, a secondary fat grafting procedure or a dermal bioengineered filler is required to fine-tune aesthetic results. If indicated, our group prefers Radiesse (Merz USA, Greensboro, N.C.) mixed with 2 cc of 0.5% lidocaine and 1:100,000 epinephrine to supplement volumization. In a retrospective review of our practice over the past 5 years, we have experienced zero complications with this harvesting technique and fat grafting approach to the hand, but longer studies in a larger patient population are required to assess long-term outcomes.

CONCLUSIONS

Hand rejuvenation with autologous fat grafting is a safe and effective method for creating a youthful appearance of the dorsum of the hand. The technique described uses minimal access and blunt dissection in the dorsal superficial and dorsal intermediate laminae to effectively augment the soft-tissue compartments in the hand. Supplemented with massage, this approach addresses the prominent aged anatomy, providing excellent contour and aesthetic outcomes.

Rod J. Rohrich, M.D.

Department of Plastic Surgery
University of Texas Southwestern Medical Center
1801 Inwood Road
Dallas, Texas 75390-9132
rod.rohrich@utsouthwestern.edu

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